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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

# Duration of Deer Forage Benefits After Clearcut Logging of Subalpine Forest in Colorado

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## Abstract

In subalpine forests of central Colorado, measurement of use by mule deer (*Odocoileus hemionus*) 2, 10, and 15 years after clearcut logging, and forage production 15 and 20 years after logging, indicate an initial negative, but brief, habitat influence followed by benefits that peak before 15 years but persist well beyond 20 years.

**Keywords:** Deer forage, logging.

During the secondary succession following logging, deer forage supplies increase for a period of years, then decrease as the forest canopy closes. If the time scale for this process were defined for each forest type, cutting rotations could be designated to better serve multiple-use management goals. This sequence was studied with respect to forage supplies for mule deer in subalpine forests on the Fraser Experimental Forest in central Colorado.

In 1954-56 a small watershed, Fool Creek, was logged in alternating clearcut and uncut strips as an experiment in multiple-use forest management (Alexander 1957, Goodell 1958). The cut strips were 1, 2, 3, and 6 chains wide, with all trees larger than 4 inches d.b.h. felled. Uncut strips were the same width as adjacent cut strips (fig. 1).

Two years after logging, deer used cut strips less than uncut strips (Porter 1959). However, 12 years after logging, use of the cut strips was triple that of uncut strips, and use on the Fool Creek watershed was double that on an

adjacent control watershed (Wallmo 1969). Food habits of deer were determined 15 years after logging in the cut and uncut strips. The tame deer used in this study preferred to graze in cut strips, spending 72% of their time and obtaining 70% of their forage in these areas (Wallmo et al. 1972). At that time, the end-of-season standing crop of understory herbage on the cut strips exceeded the crop on uncut strips by  $463 \pm 214$  pounds per acre (Wallmo et al. 1972). There was a greater number of species in the cut strips, but no apparent differences in the nutritional quality of forage plants (Regelin et al. 1974). Herbage yields were measured again 20 years after logging. This paper compares 15-year and 20-year post-logging results.

## Methods

The herbage crop was sampled in August 1975 by the same methods used in August 1970 (Wallmo et al. 1972). On 10 pairs of adjacent cut or uncut strips, fifty 1- x 2-foot quadrants were clipped on each strip. The 13 major forage species were clipped and sacked individually, and all other species, including those occasionally grazed, were sacked together. All live plant material, except conifer species, in or

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Figure 1. Photo of Fool Creek.

overhanging the quadrant up to 5 feet was clipped. Samples were dried at 100° C for 24 hours and weighed to the nearest 0.1 g. Differences in herbage and forage yields between cut and uncut strips were evaluated using a two-way analysis of variance for 1970 and 1975 data separately. Differences within cut and uncut strips between 1970 and 1975 were also evaluated by a two-way analysis of variance. In all cases, the level of difference considered significant is  $P < 0.05$ .

## Results

Both in 1970 and 1975, 15 and 20 years after logging, there was a significantly greater amount of forage and nonforage species on cut strips than on uncut strips (table 1). From 1970 to 1975, the estimated herbage yield decreased on cut strips and increased on uncut strips, and

the crop of 13 major forage species increased in both treatments. However, these changes were not significantly different. Yields of *Vaccinium* spp. (*V. scoparium* and *V. myrtillus*), the major contributor to herbage biomass and to deer diets, did not change significantly from 1970 to 1975 (table 2). Among the major forage species, the only statistically significant change was a decrease in *Rosa acicularis* on cut strips. The only other significant change was a decrease in nonforage species on cut strips.

In 1970, the estimated herbage crop on cut strips was 118% greater than on uncut strips, and, in 1975, only 75% greater. The crop of forage species on cut strips was roughly 47% and 36% greater on cut than on uncut strips in 1970 and 1975, respectively. In 1970, there was approximately 23% and, in 1975, 8% more *Vaccinium* spp. on cut strips than on uncut strips. The magnitudes of these estimated differences is not great, but they suggest that differences in biomass of understory vegetation between cut and uncut strips is narrowing.

Table 1. Standing crop biomass ( $\pm 95\%$  confidence interval) in cut and uncut strips on Fool Creek Watershed, Fraser Experimental Forest, Colorado during 1970 and 1975.

Vegetation Category	Pounds per acre			
	Cut Strips		Uncut Strips	
	1970	1975	1970	1975
Forage species	509 $\pm$ 39	554 $\pm$ 46	346 $\pm$ 31	408 $\pm$ 40
Nonforage species	344 $\pm$ 54	205 $\pm$ 35	45 $\pm$ 18	25 $\pm$ 8
Total	853 $\pm$ 61	759 $\pm$ 56	391 $\pm$ 35	433 $\pm$ 41

## Discussion

Twenty years after logging spruce-fir and lodgepole pine forests, the production of understory herbage and deer forage was still greater on cut areas than on adjacent uncut areas. The estimated change from 15 to 20 years after logging was not great nor statistically

Table 2. Standing crop biomass ( $\pm 95\%$  confidence interval) of the 13 major forage species<sup>1</sup> in cut and uncut strips on Fool Creek Watershed, Fraser Experimental Forest, Colorado in 1970 and 1975.

Species	Pounds per acre			
	Cut Strips		Uncut Strips	
	1970	1975	1970	1975
<i>Vaccinium</i> spp. <sup>2</sup>	397.0 $\pm$ 38.6	410.2 $\pm$ 43.7	321.8 $\pm$ 30.7	378.2 $\pm$ 39.4
<i>Arnica cordifolia</i>	40.9 $\pm$ 6.5	47.0 $\pm$ 7.2	14.3 $\pm$ 4.2	14.7 $\pm$ 4.0
<i>Epilobium angustifolium</i>	47.1 $\pm$ 10.1	47.9 $\pm$ 9.9	0.1 $\pm$ 0.1	0.1 $\pm$ 0.1
<i>Taraxacum officinale</i>	8.6 $\pm$ 2.3	7.8 $\pm$ 3.1	0.2 $\pm$ 0.2	0.1 $\pm$ 0.2
<i>Senecio crassulus</i>	8.8 $\pm$ 3.9	7.5 $\pm$ 2.8	0.8 $\pm$ 0.8	1.3 $\pm$ 0.8
<i>Rosa acicularis</i>	6.4 $\pm$ 2.6	1.8 $\pm$ 0.7	0.5 $\pm$ 0.4	0.2 $\pm$ 0.3
<i>Saxifraga arguta</i>	6.4 $\pm$ 4.3	5.5 $\pm$ 3.2	2.1 $\pm$ 2.1	0.8 $\pm$ 1.0
<i>Shepherdia canadensis</i>	3.4 $\pm$ 4.7	2.9 $\pm$ 2.5	2.5 $\pm$ 3.4	4.8 $\pm$ 6.7
<i>Lonicera involucrata</i>	2.8 $\pm$ 3.8	12.1 $\pm$ 16.2	0.3 $\pm$ 0.5	0.8 $\pm$ 0.8
<i>Fragaria ovalis</i>	2.6 $\pm$ 1.7	7.6 $\pm$ 4.2	0.2 $\pm$ 0.2	0.8 $\pm$ 1.1
<i>Pyrola</i> spp. <sup>3</sup>	1.6 $\pm$ 1.3	1.0 $\pm$ 2.1	3.9 $\pm$ 1.6	5.2 $\pm$ 2.1
<i>Streptopus amplexifolius</i>	0.8 $\pm$ 0.5	0.4 $\pm$ 0.4	0.1 $\pm$ 0.3	0.3 $\pm$ 0.4
<i>Salix</i> spp.	0.5 $\pm$ 1.0	0.7 $\pm$ 0.9	0	0.4 $\pm$ 0.5

<sup>1</sup>Nomenclature generally conforms to Harrington (1954). Identification by Charles Feddema, Curator, Forest Service Herbarium, Fort Collins, Colo. Voucher specimens in that Herbarium.

<sup>2</sup>Include *V. scoparium* and *V. myrtillus*.

<sup>3</sup>Include *P. minor* and *P. asarifolia*.

significant, but the direction of change suggests that the difference in understory biomass between cut and uncut areas was decreasing. *Vaccinium* spp. dominate the understory vegetation on most sites in the mature forest. The increased abundance of *Vaccinium* in cut areas in the 20th year after logging and the decreased difference in the amount of *Vaccinium* in cut and uncut areas may reflect the influence of developing forest canopy.

### Literature Cited

- Alexander, Robert R. 1957. Damage to advanced reproduction in clearcutting spruce-fir, U.S. Dep. Agric., For. Serv., Rocky Mt. For. and Range Exp. Stn. Res. Note 27. 3 p.
- Goodell, B. C. 1958. A preliminary report on the first year's effects of timber harvesting on water yields from a Colorado watershed. U.S. Dep. Agric., For. Serv., Rocky Mt. For. and Range Exp. Stn., Stn. Pap. 36. 12 p.
- Harrington, H. D. 1964. Manual of the plants of Colorado. 2nd ed. Sage Books, Denver. 666 p.
- Porter, Kenneth A. 1959. Effects of subalpine timber cutting on wildlife in Colorado. M.S. Thesis. Colo. State Univ. 92 p.
- Regelin, Wayne., Olof C. Wallmo, Julius G. Nagy, and Donald R. Dietz. 1974. Effects of logging on forage values for deer in Colorado. J. For. 72(5):4-7.
- Wallmo, Olof C. 1969. Response of deer to alternate-strip clearcutting of lodgepole pine and spruce-fir timber in Colorado. USDA For. Serv. Res. Note RM-141, 4 p. Rocky Mt. For. and Range Exp. Stn., Fort Collins, Colo.
- Wallmo, Olof C., Wayne L. Regelin, and Donald W. Reichert 1972. Forage use by mule deer relative to logging in Colorado. J. Wildl. Manage. 36(4):1025-1033.